

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

COMPOSTING FACILITY

(No.)

CODE NY317

DEFINITION

A facility to process raw manure or other raw organic by-products into biologically stable organic material.

PURPOSE

To reduce the pollution potential of organic agricultural wastes to surface and ground water.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Organic waste material is generated by agricultural production or processing.
- A composting facility is a component of a planned agricultural waste management system;
- A composting facility can be constructed, operated and maintained without polluting air and/or water resources;
- There is a need to improve air quality by reducing the emissions of odorous gases; and,
- The facility is operated as a component of an agricultural management system.

CRITERIA

General Criteria Applicable to All Purposes

Laws and Regulations. The installation and operation of the composting facility shall comply with all federal, state and local laws, rules and regulations.

Safety. Safety and personal protection features and practices shall be incorporated

into the facility and its operation as appropriate to minimize the occurrence of equipment hazards and biological agents during the composting process.

Facility Siting. The bottom elevation of the composting facility shall be above the seasonal high water table and on soils with an acceptable permeability that does not allow materials to contaminate the ground water, and meets all applicable regulations, or the facility shall be installed on concrete slabs or other appropriate liners.

Ideally, compost facilities should be located outside of floodplains. However, if site restrictions require location within a floodplain, they shall be protected from inundation or damage from a 25-year flood event, or larger.

Locate compost facilities so prevailing winds and landscape elements such as building arrangement, landforms and vegetation minimize odors and protect the visual resource.

Direct surface runoff away from the compost facility. Direct contaminated runoff from compost facilities to an appropriate storage, vegetative filter area or other treatment facility for further management.

Compost Mix. Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.

Carbon-Nitrogen Ratio. The initial compost mix shall result in a Carbon to Nitrogen ratio between 25:1 and 40:1. Compost with a lower carbon to nitrogen ratio can be used if nitrogen immobilization is not a concern.

Carbon Source. A dependable source of carbonaceous material with a high C:N ratio

shall be stored and available to mix with nitrogen rich waste materials.

Bulking Materials. Add bulking materials to the mix as necessary to enhance aeration.

The bulking material may be the carbonaceous material used in the mix or a non-biodegradable material that is salvaged at the end of the compost period. If a non-biodegradable material is used, provision shall be made for its salvage.

Moisture Level. Provision may be made for maintaining adequate moisture in the compost mix throughout the compost period within the range of 40 to 65 percent (wet basis).

In high precipitation climatic regions, care shall be taken to prevent excess moisture from accumulating in the compost. Facility covers may be required to provide for a suitable product.

Temperature of Compost Mix. Manage the compost to attain and then maintain the internal temperature for the duration required to meet management goals.

When the management goal is to reduce pathogens, the compost shall attain a temperature greater than 130°F for at least 5 days as an average throughout the compost mass.

Turning/Aeration. The frequency of turning/aeration shall be appropriate for the composting method used, and to attain the desired amount of moisture removal and temperature control while maintaining aerobic degradation.

Facility Type. Selection of the composting facility/method shall be based on the availability of raw material, the desired quality of final compost, equipment, labor, time and land available.

Facility structural elements such as permanent bins, concrete slabs and roofs shall meet the requirements of Waste Storage Facility (313).

Facility Size. Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing.

Dimensions selected for elements of the compost facility shall accommodate equipment used for loading, unloading, and aeration.

Sizing of facilities for composting dead animals shall be based on normal mortality loss records for the operation. Or, in the absence of actual on-farm mortality records, refer to Table 1 of the NRCS New York Animal Mortality Facility (NY316) conservation practice standard. This table provides average ranges of animal mortality, which should be used when choosing a method for disposal, and the planned capacity of that system.

Compost Period. Continue the composting process long enough for the compost mix to reach the stability level where it can be safely stored without undesirable odors. It shall also possess the desired characteristics for its use, such as lack of noxious odor, desired moisture content, level of decomposition of original components and texture. The compost period shall involve primary and secondary composting as required to achieve these characteristics.

Test the finished compost as appropriate to assure that the required stabilization has been reached.

Use of Finished Compost. Land application of finished compost shall be in accordance with NRCS New York Nutrient Management (NY590) and/or Waste Utilization (NY633) conservation practice standards, as applicable.

Additional Criteria Applicable to When Animal Carcasses Will Be Composted

Composting animal carcasses will also be done in accordance with NRCS New York Conservation Practice Standard Animal Mortality Facility (NY316) conservation practice standard.

The site shall be well drained and located at least 200 feet from water courses, sinkholes, seasonal seeps and other areas that could have a discharge into a hydrologically sensitive area.

Sizing of facilities for composting dead animals shall be based on normal mortality loss records for the operation. In the absence of actual on-farm mortality records, refer to Table 1, found on page 3 of the NRCS New York Animal Mortality Facility (NY316), conservation practice standard. This table lists average ranges of animal mortality, which should be used when choosing a method for disposal, and the planned capacity of a system used for that purpose.

The base material shall consist of bulky, chunky absorbent organic material, high in carbon, low in nitrogen, containing pieces 2-6 inches in size. The makeup of the material shall be selected to allow for air flow while absorbing moisture.

The base shall be large enough to allow for two feet of clearance around the mass being composted.

Animals greater than 200 pounds or with an active rumen shall be lanced to avoid bloating.

The mass being composted shall be covered with 2 feet of organic material containing less than 65% moisture, such as old silage, wood chips, sawdust or bedded pack manure. The material shall be suitable to serve as a biofilter to reduce odors and insulate the pile to maintain a temperature suitable for composting.

The total height of the pile including base shall not exceed 8 feet.

Large Animals

Composting of carcasses greater than or equal to 300 pounds shall also comply with the following criteria:

- Base shall have a minimum thickness of 24 inches.
- Carcasses shall not be layered.
- Piles shall be evaluated for composting progress before turning. After 3 months, dig into pile and check for strong odors. Pile may be turned if odors are acceptable.

Small Animals

Composting of carcasses less than 300 pounds shall also comply with the following

criteria:

- Base shall have a minimum thickness of 18 inches.
- Carcasses shall be layered to obtain an initial total height of 5 feet.
- Carcasses shall be separated by 1 foot of material meeting the criteria for base material.
- Piles shall be evaluated for composting progress before turning. Timing of turning is dependent upon size of carcasses.

CONSIDERATIONS

Develop an initial compost mix with a carbon to nitrogen ratio of at least 30:1 to reduce most offensive odors.

Minimize odors and nitrogen loss by selecting carbonaceous material that, when blended with the nitrogenous material provides a balance of nutrients and porous texture for aeration.

A chemical neutralizing agent should be used if structural components do not provide adequate odor reduction.

Maximize solar warming by aligning piles north to south configured with moderate side slopes.

In humid areas, do not locate piles (windrows) across the slope to prevent ponding and sogginess.

Protect compost facilities from the wind in cold climates. Wind protection may help prevent excess drying of the compost in dry climates.

When compost will be used for organic purposes, it must comply with the National Organic Rule.

Consider turning piles to accelerate composting or when there is a concern for pathogen control.

For aesthetic reasons, consider removing large bones or incorporating them into the soil when land spreading compost residuals of large animals. Application on fields producing human direct-consumed crops is discouraged. Examples of aesthetically desirable spreading locations include forest land, crops harvested

above ground level, forage crops.

Consider using composted residuals of large animals for the subsequent base material.

Consider using windrows rather than individual piles when treating multiple mortalities.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan that is consistent with the purposes of this practice, and the life of the composting facility. Recipe ingredients and sequence that they are layered and mixed shall be given in the plan.

Safety requirements for operation of the composting facility shall be provided.

Manage the compost piles for temperature, odors, moisture, and oxygen, as appropriate. Make adjustments throughout the composting period to insure proper composting processes.

Closely monitor temperatures above 165°F. Take action immediately to cool piles that have reached temperatures above 185°F.

The operation and maintenance plan shall state that composting is a biological process. It requires a combination of art and science for

success. Hence, the operation may need to undergo some trial and error in the start-up of a new composting facility.

REFERENCES

Agricultural Waste Management Field Handbook (AWMFH)

National Engineering Handbook, Part 637, Chapter 2, Composting.

Keener, H.M., D.L. Elwell, M.J. Monnin. Procedures and Equations for Sizing Structures and Windrows for Composting Animal Mortalities. 2000. Applied Engineering in Agriculture 16(6):681-692.

Trinca, Lydia A., Bruce Miller, and F. Richard Beard. Bovine Mortality Composting in Northern Utah. 1999. Presented at 1999 ASAE/CSAE-SCGR Annual International Meeting, July 18-21, 1999.

Bonhotal, J., L. Telega, J. Petzen. Natural Rendering: Composting Livestock Mortality and Butcher Waste. 2002. Cornell Waste Management Institute.

Livestock, Poultry, and Environmental Stewardship (LPES) Curriculum, Animal Mortality, Chapter 51, Midwest Planning Service, Ames, Iowa.

Northeast Regional Agricultural Engineering Service publication No. 54, On Farm Composting Handbook, Cornell Cooperative Extension, Ithaca, NY.